REMARKS

In the Office Action, dated December 31, 2003, the examiner rejected all of the pending claims 1-3, 8, and 9 under 35 U.S.C. §112, second paragraph, for various specific reasons explained on pages 2 and 3 of the Office Action. Claims 1, 8, and 9 were rejected under 35 U.S.C. §103(a) as being unpatentable over the admitted prior art in Jepson claim 1 in view of Eberhardt et al. Claim 2 was rejected under 35 U.S.C. §103(a) over the admitted prior art in the preamble of the Jepson claim 1 and Eberhardt et al., and further in view of MKS Instruments Moducell Pirani Analog Transducer, Bulletin. Claim 3 was rejected as being unpatentable over the admitted prior art in the preamble of Jepson claim 1 and Eberhardt et al., and further in view of MKS Instruments Baratron Vacuum, Atmospheric and Pressure Switch Bulletin.

Claims 1, 8, and 9 are amended to overcome the grounds for the 35 U.S.C. §112, second paragraph rejections, as described by the examiner.

The preambles of claims 1, 8, and 9 are amended to clarify that the claimed invention is applicable to load locks that are connected to either a transfer or processing chamber, as explained in the specification, paragraph [0007].

<u>35 U.S.C. §103(a) issues</u>:

A number of the examiner's characterization of the disclosures in Eberhardt et al. are erroneous, and Eberhardt et al. does not support the 35 U.S.C. §103(a) rejections of the claims. Specifically, contrary to the examiner's assertions, Eberhardt et al. does not disclose or fairly suggest either of the following: (i) a differential pressure sensor 34 connected to the chamber 14 and mounted such that the first side is exposed to the ambient atmospheric pressure in the room and such that the second side is exposed to the pressure in the chamber; or (ii) an absolute pressure transducer circuit . . . comprising a portion of the microprocessor based controller set forth in column 15, line 21, connected to the absolute sensor and which is capable of generating an interior door control signal at a preset absolute pressure value. Therefore, those premises used by the examiner for rejecting applicants' claims 1-3, 8, and 9 are groundless.

The most that Eberhardt et al. shows is that vacuum chambers, absolute pressure sensors, differential pressure sensors, manifolds, and microprocessors existed prior to this invention. However, the applicants do not claim to have invented vacuum chambers, nor do they claim to have invented either absolute pressure gauges or differential pressure gauges.

They also do not claim to have invented manifolds. The applicants do, however, claim to have invented a unique system, which utilizes those components, to solve a particular load lock control problem, and to provide more efficient transfer of parts from the atmosphere, through a load lock, and into a vacuum chamber with better exterior and interior door control and less contamination than was possible or feasible before this invention.

<u>The differential pressure sensor 34 in Eberhardt et al. does not have one side exposed to the ambient atmosphere</u>.

The examiner correctly identified an absolute pressure sensor 34 and a vacuum chamber 14 in Eberhardt et al., and he found, correctly, that one side of the differential pressure sensor 34 is connected to the vacuum chamber 14, *albeit* not via a manifold. However, the other side of the differential pressure sensor 34 in Eberhardt et al. is not exposed to the ambient atmosphere, as suggested by the examiner. On the contrary, as clearly shown in Figure 16B and explained in column 8, lines 25-35 and 63-67, of Eberhardt et al., the other side of the differential pressure sensor 34 is connected by the gas exchange manifold 450 to gas exchange head 50 and, thereby in operation, to the sealed container 12 (not shown in Figure 16B, but shown in Figures 1 and 2), and the sealed container 12 is positioned inside the vacuum chamber 14 (see Eberhardt et al., column 22, lines 25-26). Specifically, as explained by Eberhardt et al:

> As shown in FIGS. 1-3, the gas exchange apparatus, generally designated 10, includes ***a vacuum chamber 14 for receiving a container 12 having a lid or wrapping 20.***

Eberhardt et al., column 5, lines 32-35 (emphasis added).

> ***Differential pressure sensor 34 is coupled on one end to the sense probe line*** in gas exchange manifold 450 ***and on the other end to the chamber 14*** by probe sense line 35. ***The differential pressure sensor 34 may be a differential pressure transducer. In an alternate embodiment, two absolute pressure gauges may be used in place of the differential pressure sensor 34. In this embodiment, one gauge measures the pressure in the chamber [14] and the other measures pressure in the container [12].*** The readings between the two gauges are then compared and the difference calculated to arrive at the differential pressure.

Eberhardt et al., column 8, lines 25-35 (emphasis added).

Therefore, it is very clear that the differential pressure sensor 34 in Eberhardt et al. is not exposed on one side to the ambient atmospheric pressure in the room. On the contrary the differential pressure sensor 34 in Eberhardt et al. is exposed on one side to the vacuum chamber 14 and on the other side to the sealed container 12, which, itself, is positioned inside the vacuum chamber 14.

As also explained by Eberhardt et al.:

> A control algorithm, which may be implemented by a microprocessor based controller, is preferably utilized to oversee, control, and adjust the gas exchange procedure. In conducting the gas exchange, ***the container 12 and the chamber 14 are simultaneously evacuated under controlled conditions so as not to damage the container [12]*** until the pressure within the container [12] reaches a sufficiently low level (e.g., 0.1 atm). ***Once the container [12] is evacuated, a replacement gas, such as oxygen, is released into the container [12], while atmospheric air is simultaneously released into the chamber 14 in a controlled manner. The control algorithm is preferably designed to maintain a slightly positive container-to-chamber differential pressure throughout the vacuum and fill cycles so as not to damage the container or force the lid onto the enclosed product.***

Eberhardt et al., column 15, lines 20-34 (emphasis added).

<u>Eberhardt et al. does not show or suggest the use of absolute pressure for generating an interior door control signal at a pre-set absolute pressure value</u>.

First of all, Eberhardt et al. do not have or suggest an interior door or an interior door control signal. Eberhardt et al. do explain in the quote above that they evacuate their chamber 14 and their container 12 simultaneously while maintaining a desired differential pressure between them with their differential pressure sensor 36, until the head space pressure in the container 12 is lowered to a desired level, i.e., not greater than 0.1 atm., at which time the vacuum step is terminated and the valves are turned off (See Eberhardt et al., column 19, lines 9-15). However, if the examiner is suggesting that this

pressure measurement used by Eberhardt et al. for their vacuum termination and valve shut-off could be used instead to generate an interior door control signal at a preset absolute pressure value for the interior load lock door according to the applicants' claimed invention, that suggestion would miss the mark. As explained by Eberhardt et al., while they use absolute pressure sensors 36, 39 to measure the pressures in their vacuum chamber 14 during their evacuation and fill steps, respectively, they do not use absolute pressure values. Instead, Eberhardt et al. explain further:

> It is desirable for the gas exchange apparatus to supply containers having a consistent final gas mixture in the container. Because the shut-off parameters are calculated relative to measured atmospheric pressure, machine cycle and container characteristics are sensitive to barometric pressure. Changes in the atmospheric pressure can produce varying results. For example, in the presence of high atmospheric pressure, less of the container head space is evacuated before the apparatus reaches the target pressure during the vacuum step. Thus, there is less room for the replacement gas during the fill step, and the replacement gas is present in lower quantities than may be desired. In contrast, it is desirable to have consistent, repeatable percentages of the final fill gas mixture. <u>In order to account for the changes in pressure, a sensor may be used to determine barometric pressure, and the "end" or "shut-off" chamber pressure may be determined as a percentage of the measured atmospheric pressure.</u> <u>It has been found that during low pressure weather conditions, the apparatus may attempt to extract more of the container atmosphere, which extends the time to complete the vacuum cycle (or perhaps, causes the apparatus to never meet the vacuum shut-off criteria).</u> <u>Accordingly, the use of an absolute pressure gauge allows one to measure and adjust for barometric pressure.</u> <u>This results in a consistent final fill gas composition and a more consistent machine cycle time for each container.</u> Furthermore, each machine can be automatically calibrated for changes in barometric pressure due to usage in high or low altitudes.

Eberhardt et al., column 21, lines 30-57 (emphasis added). Further, Eberhardt et al. note at column 17, lines 56-59, "Unless it is otherwise noted, pressures are expressed in values relative to the measured atmospheric pressure during the vacuum/fill cycle, and not standard atmospheric pressure."

Therefore, when Eberhardt et al. explain, for example, that once the head space in the container 12 is evacuated to a "pressure not greater than 0.1 atm, the vacuum step is terminated at step 138, and the valves are turned off" (column 19, lines 1-15), that low target pressure of

0.1 atm. is relative to a measured atmospheric pressure and is not the absolute pressure value. The same barometric pressure adjustment applies to the pressures used during the fill portion of the Eberhardt et al. cycle. (See Eberhardt et al., column 21, lines 30-57.) Consequently, it is clear that Eberhardt et al. do not teach or fairly suggest the use of absolute pressure at the low end to signal the end of their evacuation portion of the cycle or to shut-off their evacuation valves. Therefore, there is no teaching or suggestion in Eberhardt et al. of any such absolute pressure signal at the low pressure end to be used in combination with differential pressure at the high end to signal the end of the fill portion of the cycle. On the contrary, Eberhardt et al. use the same process of adjusting absolute pressure measurements for barometric pressure at both their low pressure and high pressure ends of their chamber 15 evacuation and fill cycle.

<u>Eberhardt et al. does not show or suggest manifolded pressure apparatus or methods</u>.

As noted by the examiner, Eberhardt et al. teaches the use of a manifold 402 to connect a plurality of components in fluid flow relation, although applicant could find no reference in Eberhardt et al. to using the manifold 402 to conserve space. Eberhardt et al. do use their manifold 402 to gang valves together, not pressure sensors. In any event, just as applicant does not claim to have invented either differential pressure sensors or absolute pressure sensors, applicant also does not claim to have originated the concept of manifolds. However, the applicant does claim the invention of a unique combination that solves a problem, which is unique to load lock operations, i.e., large pressure ranges from atmosphere down to at least 10^{-4} torr (not just down to the 0.1 atm low pressure end of Eberhardt et al.), which is outside the range of any known single pressure sensor, and where contamination can be caused by any significant rushes or currents of air or gases due to door operations at inappropriate pressures. The manifold does not just conserve space, as indicated by the examiner; it facilitates bundling the applicants' differential pressure sensor together with the absolute pressure sensor in a combination that exposes both of them to the same load lock pressure with circuits that output both interior and exterior door control signals on a connector in a manner that operates, fits, and is needed for load lock control.

Re claim 1:

Claim 1 has been amended in a manner that the applicant believes will eliminate the 35 U.S.C. §112, second paragraph, problems specified by the examiner. If the examiner does not agree that these changes accomplish that purpose, he is invited to contact the applicants' attorney at the telephone number listed below to resolve any remaining 35 U.S.C. §112, second paragraph, issues. Also, in the preamble of claim 1, the words --transfer or-- are added to make it more clear that the prior art portion of the combination recited in the preamble can include a transfer chamber, as explained in the specification, paragraph [0007].

As explained above, Eberhardt et al. use the same absolute pressures adjusted for barometric pressure at both the low pressure and high pressure ends of their chamber evacuation and fill cycle, whereas claim 1 recites differential pressure for the exterior door control signal and absolute pressure for the interior door control signal. Also, the differential pressure sensor 34 of Eberhardt et al. does not have one side exposed to the atmosphere, and there is no manifolded bundling in Eberhardt et al. of absolute and differential pressure sensors to provide pressure transducer apparatus to output an interior door control signal based on absolute pressure at the low end and an exterior door control signal based on differential pressure at the high end of a vacuum/fill cycle. Therefore, the applicants believe claim 1 is not obvious over Eberhardt et al. and is allowable.

Re claim 2:

Claim 2 is amended to include the pressure range of the absolute pressure pressure sensor, as found in the specification, paragraphs [0013], [0031], [0033], and [0034]. This absolute pressure range of the regular pirani sensor used in this invention is added to claim 2 to emphasize this feature over the higher range (about 1,000 torr down to 10^{-3} torr) convection pirani sensors used in prior art load lock controls, as explained in the specification, paragraph [0034]. Applicant does not claim to have invented the regular pirani sensor with that lower range, but, as explained in paragraph [0034], its selection and use in this combination extends the range below the 10^{-3} torr lower limit provided by convention pirani sensors previously used for load lock control. This extended lower pressure range is possible, but previously unrecognized, because the use of the differential pressure sensor in this combination not only

provides better high pressure range exterior door control, but it also enables the use of the regular pirani sensor in the combination for its more advantageous lower absolute pressure range, e.g., down to 10^{-4} torr. This feature is not taught or suggested by Eberhardt et al. in further view of MKS Instruments Moducell Pirani Analog Transducer Bulletin. Therefore, claim 2 is not obvious over those prior art references and it is believed to be allowable under both 35 U.S.C. §102 and 35 U.S.C. §103.

<u>Re claim 3</u>:

Claim 3 depends from amended claim 1, thus is believed to be allowable.

<u>Re claim 8</u>:

Claim 8 has been amended to address the 35 U.S.C. §112, second paragraph, issues raised by the examiner, to correct several word processing errors, and to include the transfer chamber in the preamble, as discussed for claim 1 above. Also, claim 8 has been amended to include more explicitly the manifolded bundling as explained for claim 1 above. Claim 1 now recites the combination of low end interior door control signals based on absolute pressure in the manifold and high end exterior door control signals based on differential pressure between the manifold and atmosphere, which, as explained above, is not taught or fairly suggested by Eberhardt et al. Therefore, claim 8 is not obvious over Eberhardt et al. and is believed to be allowable under both 35 U.S.C. §102 and 35 U.S.C. §103.

<u>Re claim 9</u>:

Claim 9 has been amended to address the 35 U.S.C. §112, second paragraph, issues raised by the examiner, as well as to include the manifolded bundling and advantageous low pressure extension by use of the lower pressure range of regular pirani sensors in contrast to convection pirani sensors for the low pressure interior door control in combination with the differential pressure for the high pressure exterior door control, as explained above for claims 1 and 2. Therefore, claim 9 is also not obvious over Eberhardt et al. and is believed to be allowable under both 35 U.S.C. §102 and 35 U.S.C. §103.

Summary:

All of the pending claims 1-3, 8, and 9, as amended, are now believed to be allowable for, *inter alia*, the reasons explained above. Therefore, the examiner is requested to withdraw his rejections and to grant an allowance of these claims. If any issues remain to be resolved, the examiner is requested to contact applicant's attorney at the telephone number listed below.

Respectfully Submitted,
COCHRAN FREUND & YOUNG LLC

Dated: June 1, 2004

By: James R. Young

James R. Young
Reg. No. 27,847
Tel.: 970-377-6363